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Rocky Flats Plant

Dec. - 1987 EAC-4201 10-160

Monthly Environmental Monitoring Report

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D I S T R I B U T I O N (cont.)

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Internal Distribution
Rocky Flats Plant

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DECEMBER 1987 ENVIRONMENTAL MONITORING REPORT
ROCKY FLATS PLANT

This report summarizes the effluent and environmental monitoring programs at the Rocky Flats Plant for the month of December, 1987.

Included in the report are monitoring results for radioactive and nonradioactive airborne effluents continuously sampled from Plant buildings, Tables I and II. Tables III through VI summarize environmental monitoring data from the Rocky Flats Plant ambient air sampling network. This network is comprised of continuously operating air samplers located on plantsite, around the Plant boundary, and in neighboring communities.

Water sampling results for radioactive constituents are given in Tables VII through IX. Results are summarized for Plant surface water control ponds, for nearby drinking water reservoirs, and for tap water for neighboring communities. Nitrate monitoring for Great Western Reservoir and Standley Lake, the two drinking water reservoirs which can receive surface water discharges from the Plant, are summarized in Table X.

The Environmental Protection Agency (EPA) has issued to the Plant a National Pollutant Discharge Elimination System (NPDES) permit for control of surface water discharges. Water sampling results associated with the NPDES permit, as well as applicable discharge limitations imposed by that permit, are reported in Table XI. Daily flow data for surface water from the two Plant drainage systems are given in Tables XII and XIII.

The Rocky Flats Plant Environmental Monitoring Program includes evaluating plant compliance with all relevant guides, limits, and standards. All average results of monitoring effluent and ambient samples complied with the applicable standards as specified in Executive Order 12088 (rules, regulations, and requirements of the Department of Energy).

The data provided in this report are provided as a matter of comity and should not be construed as an application for a permit or license, or in support of such an application. Approval of the Department of Energy should be obtained prior to publication of any data contained within this report.

Table I. 1987 Plutonium and Uranium Airborne Effluent Data

<u>Month</u>	Plutonium		Uranium	
	<u>Release</u> <u>(uCi)</u>	<u>CMax</u> <u>(pCi/m³)</u>	<u>Release</u> <u>(uCi)</u>	<u>CMax</u> <u>(pCi/m³)</u>
CY 1986	14.33	0.047 ± 0.0082	21.24	0.133 ± 0.0152
January	1.39	0.095 ± 0.0155	2.15	0.017 ± 0.0013
February	0.89	0.071 ± 0.0081	1.99	0.095 ± 0.0091
March	1.84	0.229 ± 0.0278	1.12	0.005 ± 0.0004
April	2.02	0.016 ± 0.0013	0.87	0.004 ± 0.0005
May	1.28	0.104 ± 0.0175	0.94	0.003 ± 0.0004
June	0.69*	0.005 ± 0.0012	0.98	0.003 ± 0.0004
July	1.22	0.019 ± 0.0021	1.21	0.004 ± 0.0005
August	0.65	0.010 ± 0.0011	1.91	0.006 ± 0.0008
September	0.63	0.003 ± 0.0003	1.31	0.004 ± 0.0003
October	1.80	0.006 ± 0.0007	1.50	0.004 ± 0.0003
November	1.42	0.015 ± 0.0015	1.13	0.002 ± 0.0004
December	1.51**	0.016 ± 0.0018**	1.66	0.008 ± 0.0013
Year to Date	15.34**	0.229 ± 0.0278**	16.77	0.095 ± 0.0091

* Estimated June plutonium emissions are included for 12 of 37 sampling locations because of low chemical recoveries for those samples.

Estimated June plutonium emissions are based on measured air emissions for 25 sampling locations (contributing 0.60 uCi total) and six-month averages for the 12 affected locations (contributing an additional 0.09 uCi total).

** Incomplete analysis.

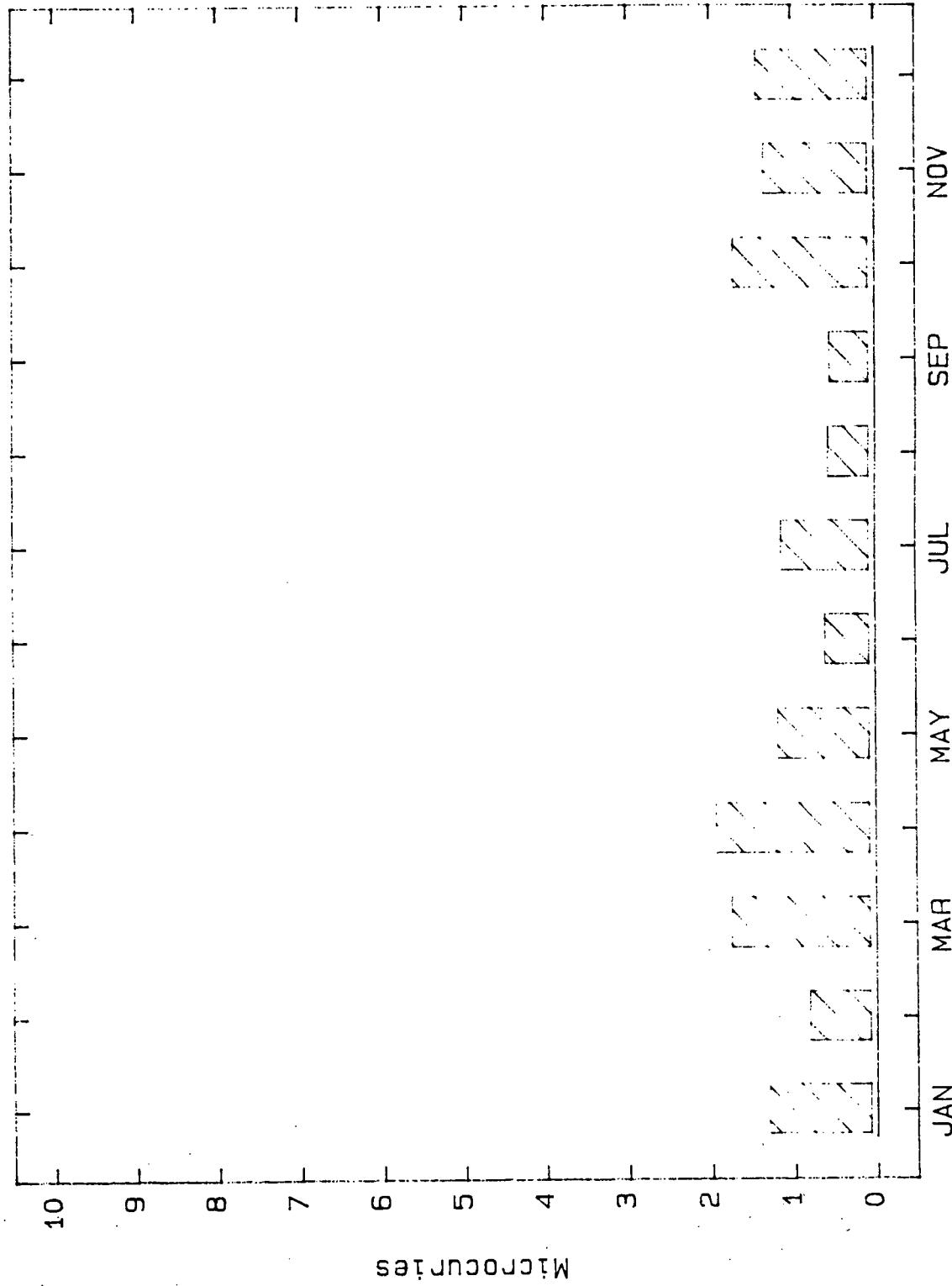
NOTE: The plutonium, uranium, americium, and beryllium measured concentrations in this report include values that are less than the corresponding calculated MDC's. In some cases, the values are less than zero. This method of reporting began in January 1981. These negative values result when the measured value for the laboratory reagent blank is subtracted from an analytical result which was measured as a smaller value than the reagent blank. This may happen when measuring concentrations which are very close to zero.

Table II. 1987 Tritium and Beryllium Airborne Effluent Data

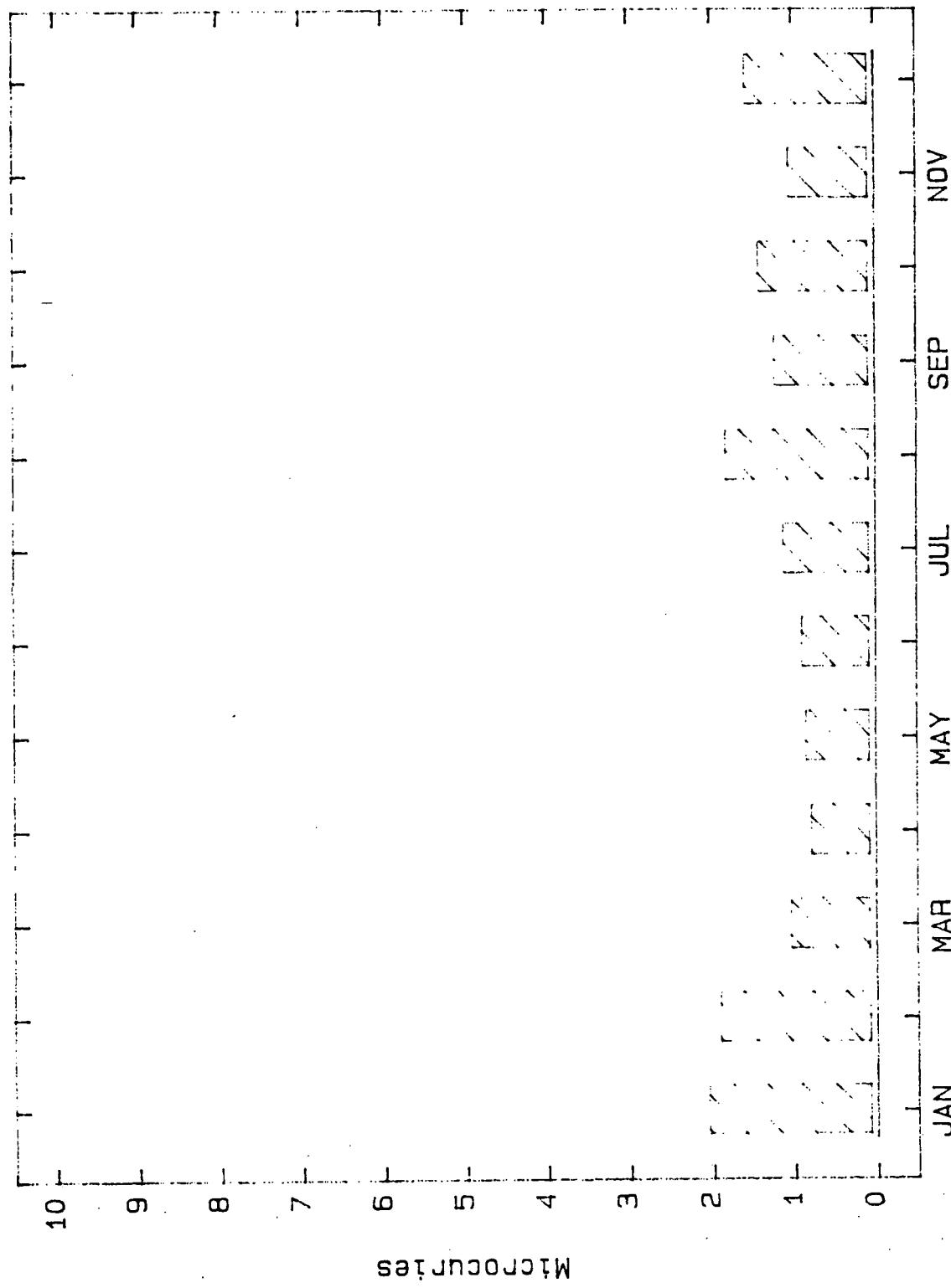
<u>Month</u>	<u>Tritium</u>		<u>Beryllium</u>	
	<u>Release (Ci)</u>	<u>CMax (pCi/m³)</u>	<u>Release (gms)</u>	<u>CMax (ug/m³)</u>
CY 1986	0.218	36700 ± 950	0.1299	0.00053
January	0.005	410 ± 180	0.0276	0.00042
February	0.008	250 ± 80	0.0085	0.00006
March	0.004	470 ± 180	0.0091	0.00014
April	0.007	270 ± 60	0.0130	0.00010
May	0.013	560 ± 210	0.0143	0.00011
June	0.005	260 ± 60	0.0137	0.00014
July	0.013	420 ± 160	0.0099	0.00008
August	0.025	3402 ± 570	0.0207	0.00021
September	0.031	8580 ± 900	0.0048	0.00004
October	0.003	875 ± 300	0.0233	0.00012
November	0.051	8748 ± 850	0.0045	0.00005
December	0.005	729 ± 200	0.0154	0.00007
Year to Date	0.170	8748 ± 850	0.1648	0.00042

NOTE: Beryllium measured at 36 other screening locations was below the screening level of 0.1 gram per month.

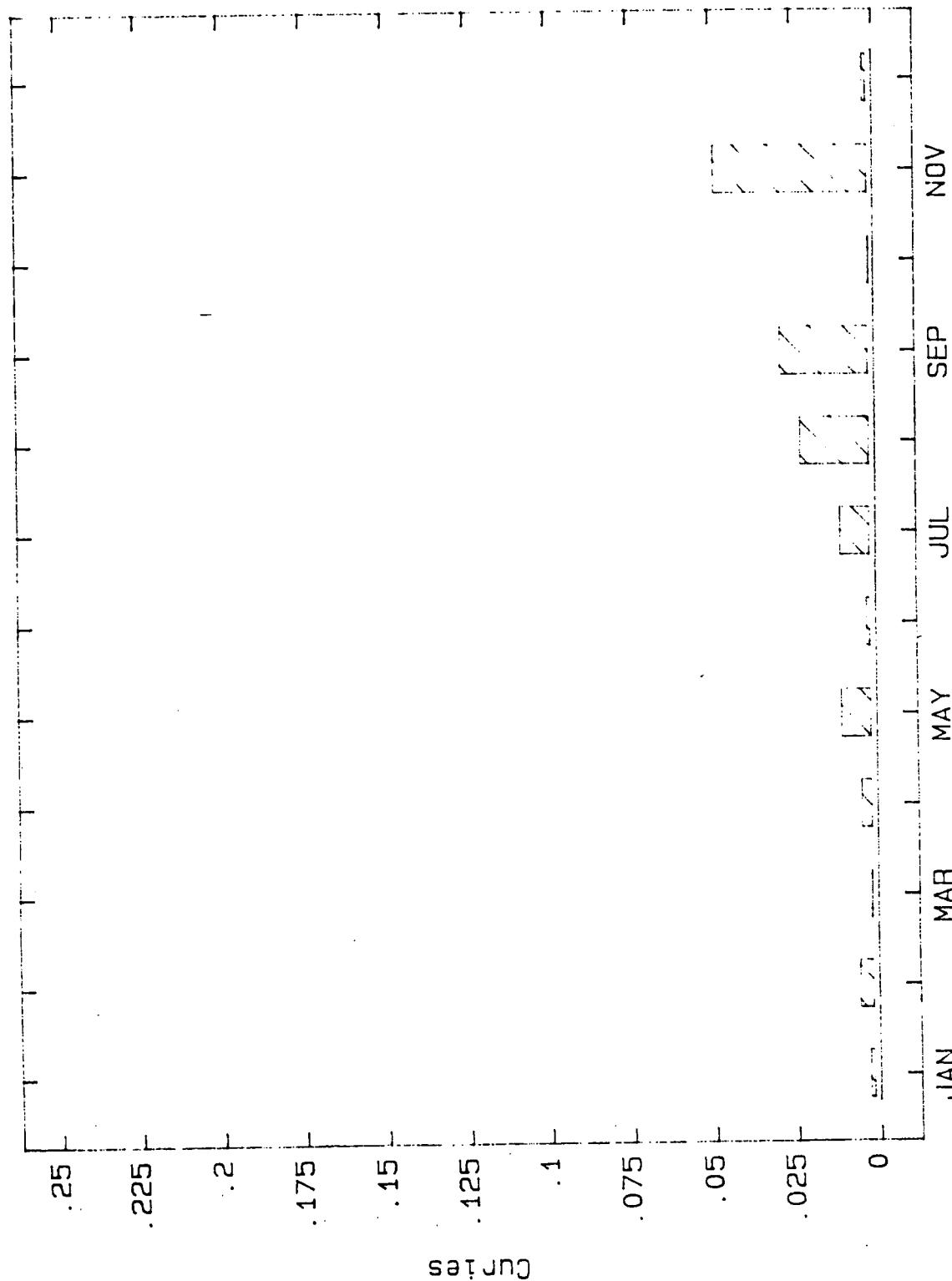
PLUTONIUM MEASURED IN EFFLUENT AIR

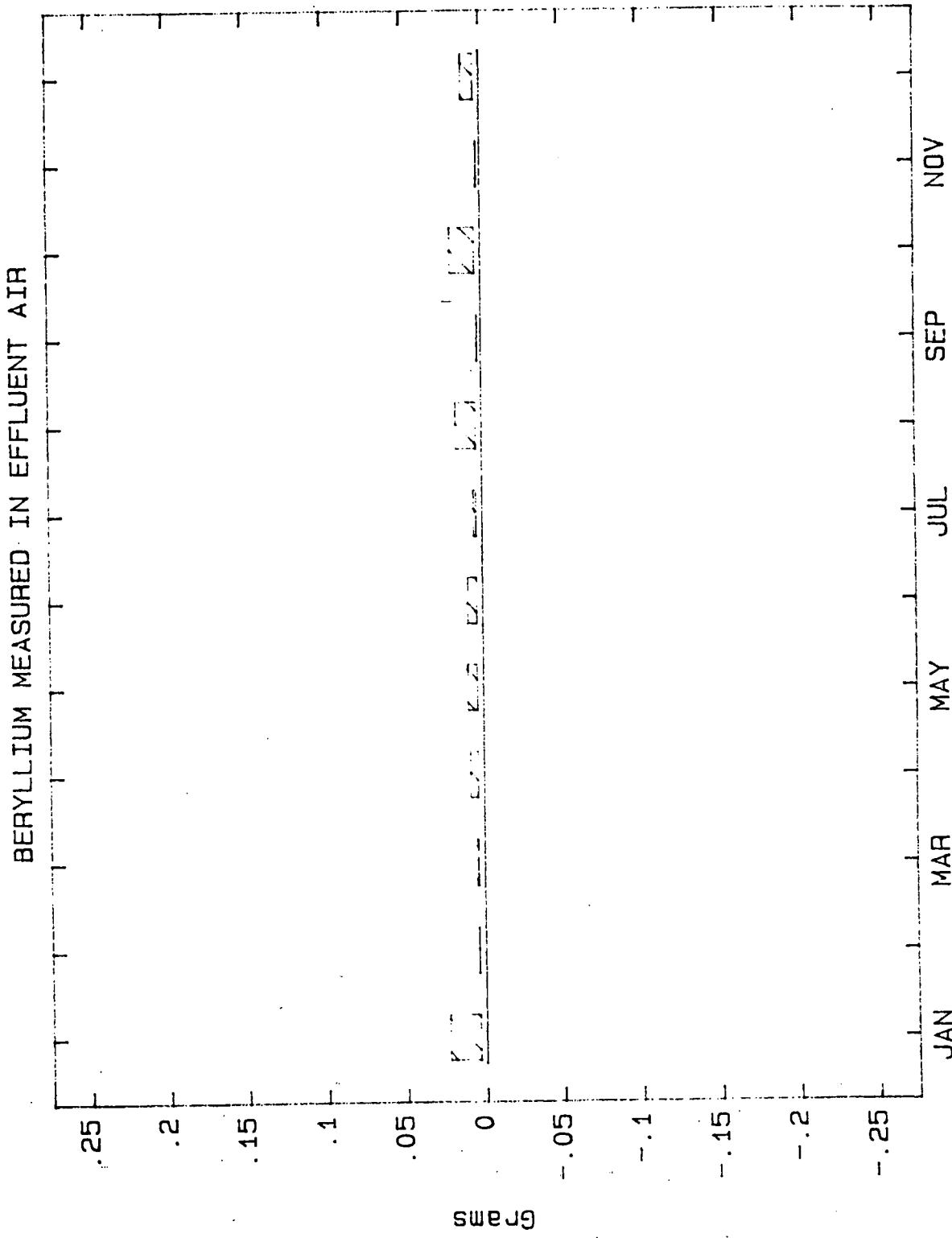


URANIUM MEASURED IN EFFLUENT AIR



TRITIUM MEASURED IN EFFLUENT AIR





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Table III. Plutonium at Selected Onsite Ambient Air Locations
(11/17/87-12/21/87)

<u>Location</u>	<u>n</u>	<u>Volume(m³)</u>	<u>Lower Confidence Limit</u>	<u>Concentration (pCi/m³)</u>	<u>Upper Confidence Limit</u>
S-04	1*	7,000	-0.000009	0.000002	0.000013
S-05	3	26,000	0.000648	0.000729	0.000810
S-06	3	31,000	0.000091	0.000107	0.000123
S-07	3	32,000	0.000165	0.000188	0.000211
S-08	3	41,000	0.000224	0.000254	0.000284
S-09	3	39,000	0.000393	0.000447	0.000501

* S-04: Sample collected from 12/15/87 to 12/21/87.

NOTE: Total long-lived alpha at the remaining 17 onsite ambient air samplers was below the screening level of 0.01 pCi/m³.

Table IV. Tritium in Ambient Air
(12/01/87 to 01/06/88)

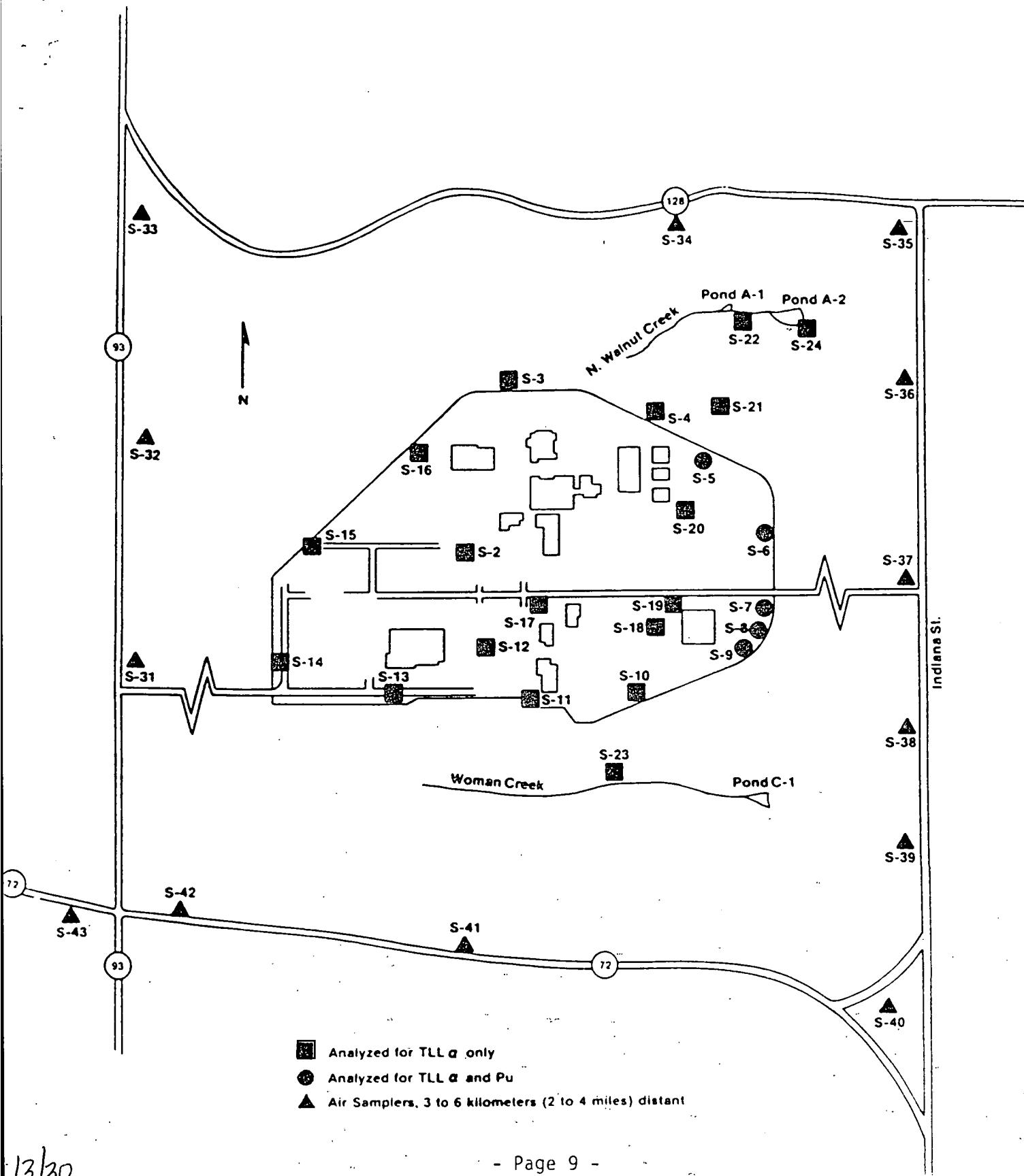
<u>Location</u>	<u>n</u>	<u>Air Volume(m³)</u>	<u>Point Estimate (pCi/m³)</u>	<u>+/- Error (pCi/m³)</u>	<u>Condensed Water Vapor (mls)</u>
S-4	5	84	0.26	0.79	154
S-5	5	51	0.26	0.72	85
S-16	5	65	-0.01	0.32	50

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Table V. Plutonium in Perimeter Ambient Air
(11/24/87-12/22/87)

<u>Location</u>	<u>n</u>	<u>Volume(m³)</u>	Concentration(pCi/m ³)		
			<u>Lower Confidence Limit</u>	<u>Point Estimate</u>	<u>Upper Confidence Limit</u>
S-31	1	26,000	-0.000002	0.000001	0.000004
S-32	1	25,000	-0.000002	0.000001	0.000004
S-33	1	28,000	-0.000003	0.000000	0.000003
S-34	1	29,000	-0.000001	0.000002	0.000005
S-35	1	26,000	0.000003	0.000006	0.000009
S-36	1	32,000	0.000002	0.000004	0.000006
S-37	1	28,000	0.000003	0.000006	0.000009
S-38	1	29,000	0.000003	0.000006	0.000009
S-39	1	29,000	0.000003	0.000006	0.000009
S-40	1	30,000	0.000001	0.000004	0.000007
S-41	1	29,000	-0.000003	0.000000	0.000003
S-42	1	25,000	-0.000003	0.000000	0.000003
S-43	1	30,000	-0.000002	0.000000	0.000002
S-44	1	31,000	-0.000002	0.000000	0.000002
Mean Point Estimate =				0.000003	

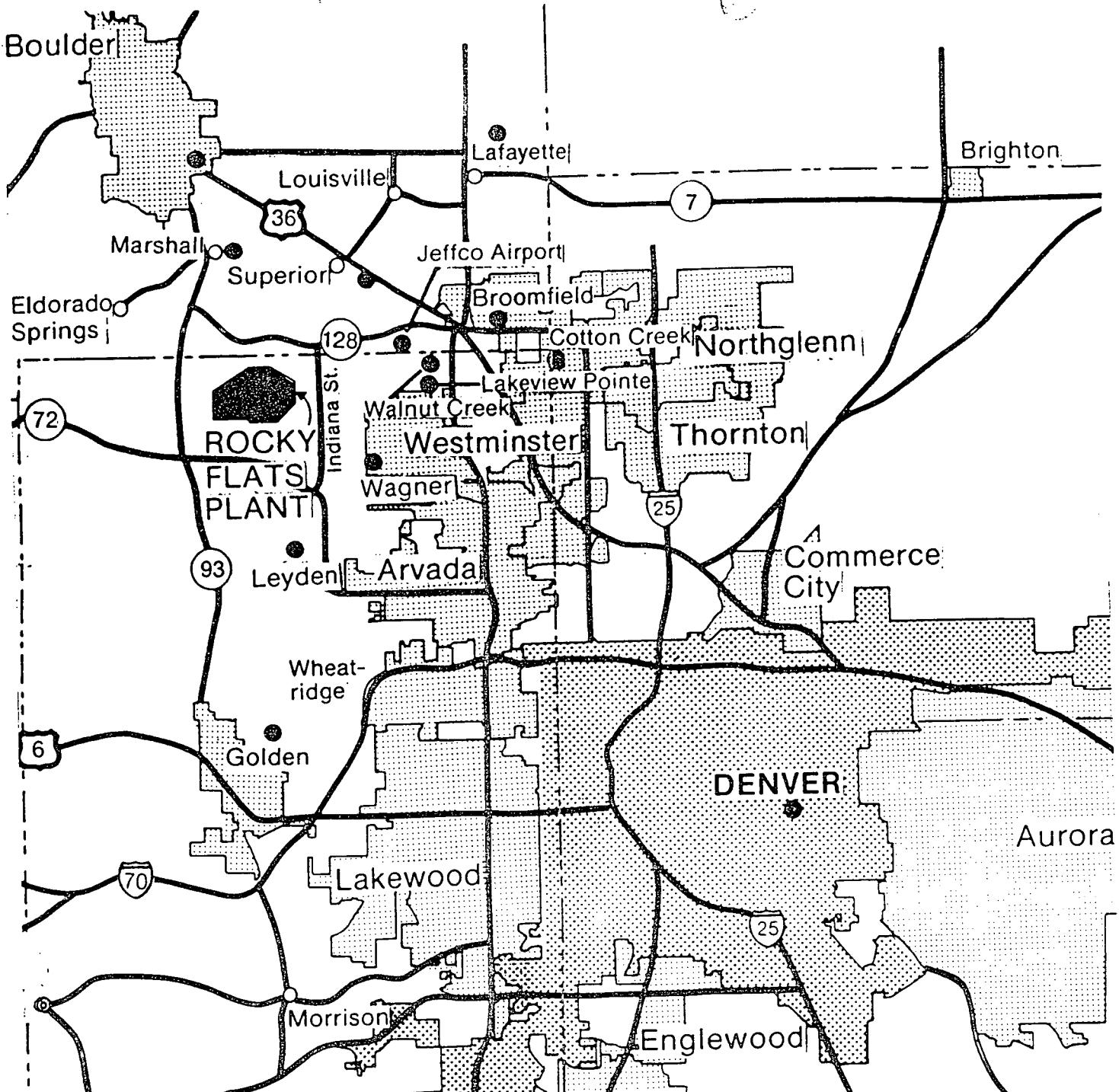
Location of Onsite and Plant Perimeter Ambient Air Samplers
(Portions of figure are not to scale.)



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Table VI. Plutonium in Community Ambient Air
(11/25/87-12/23/87)

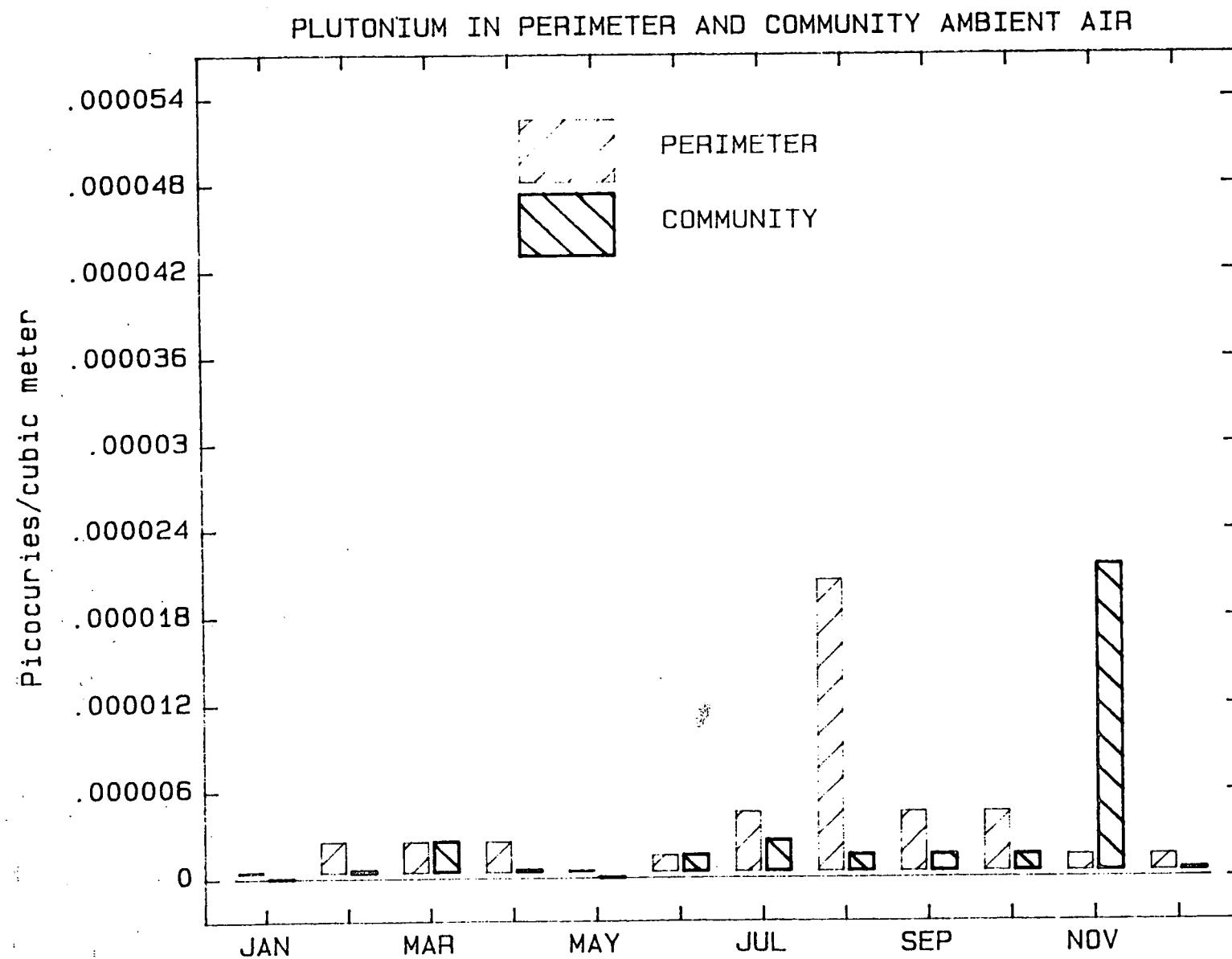
<u>Location</u>	<u>n</u>	<u>Volume(m³)</u>	Concentration(pCi/m ³)		
			<u>Lower Confidence Limit</u>	<u>Point Estimate</u>	<u>Upper Confidence Limit</u>
Marshall	1	19,000	-0.000004	0.000000	0.000004
Jeffco Airport	1	30,000	-0.000001	0.000001	0.000003
Superior	1	22,000	-0.000002	0.000001	0.000004
Boulder	1	29,000	-0.000003	0.000000	0.000003
Lafayette	1	27,000	-0.000002	0.000001	0.000004
Broomfield	1	22,000	-0.000002	0.000001	0.000004
Walnut Creek	1	30,000	0.000002	0.000005	0.000008
Wagner	1	27,000	-0.000002	0.000001	0.000004
Leyden	1	25,000	-0.000003	0.000000	0.000003
Westminster	1	20,000	-0.000004	0.000000	0.000004
Denver	1	27,000	-0.000003	0.000000	0.000003
Golden	1	27,000	-0.000004	-0.000001	0.000002
Lakeview Pointe	1	37,000	-0.000002	0.000000	0.000002
Cotton Creek	1	26,000	-0.000002	0.000001	0.000004
Mean Point Estimate				0.000001	



● Community Air Samplers

Location of Community Ambient Air Samplers

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Table VII. Water Sample Results, Radioactive Parameters

Holding Pond Outfall (pCi/l)

<u>Location</u>	<u>Plutonium</u>	<u>Uranium</u>	<u>Americium</u>
<u>Pond A-4</u>			
	NO DISCHARGE		

Pond B-5

NO DISCHARGE

Pond C-1

11/30/87 - 12/04/87	0.000 \pm 0.006	0.8 \pm 0.2	-0.002 \pm 0.005
12/07/87 - 12/11/87	0.001 \pm 0.006	1.0 \pm 0.2	0.047 \pm 0.010
12/14/87 - 12/18/87	0.030 \pm 0.007	0.03 \pm 0.10	0.005 \pm 0.005
12/21/87 - 12/24/87	0.021 \pm 0.011	0.73 \pm 0.15	0.007 \pm 0.007
Average Concentration	0.01 \pm 0.01	0.6 \pm 0.4	0.01 \pm 0.009

Pond C-2

12/21/87 - 12/23/87	0.050 \pm 0.034	4.9 \pm 0.6	-0.006 \pm 0.021
Average Concentration	0.050 \pm 0.034	4.9 \pm 0.6	-0.006 \pm 0.021

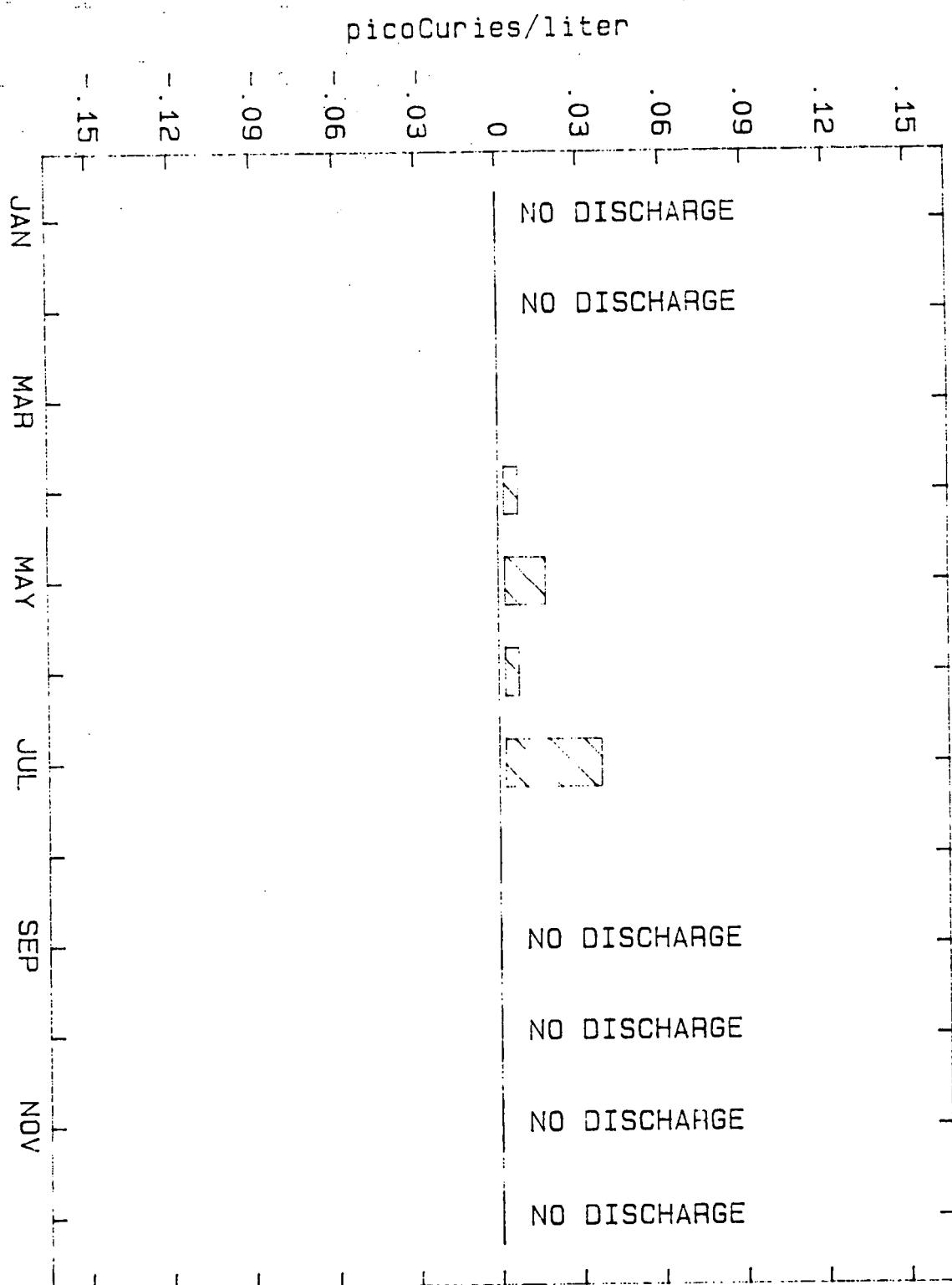
Walnut Creek at Indiana

NO FLOW

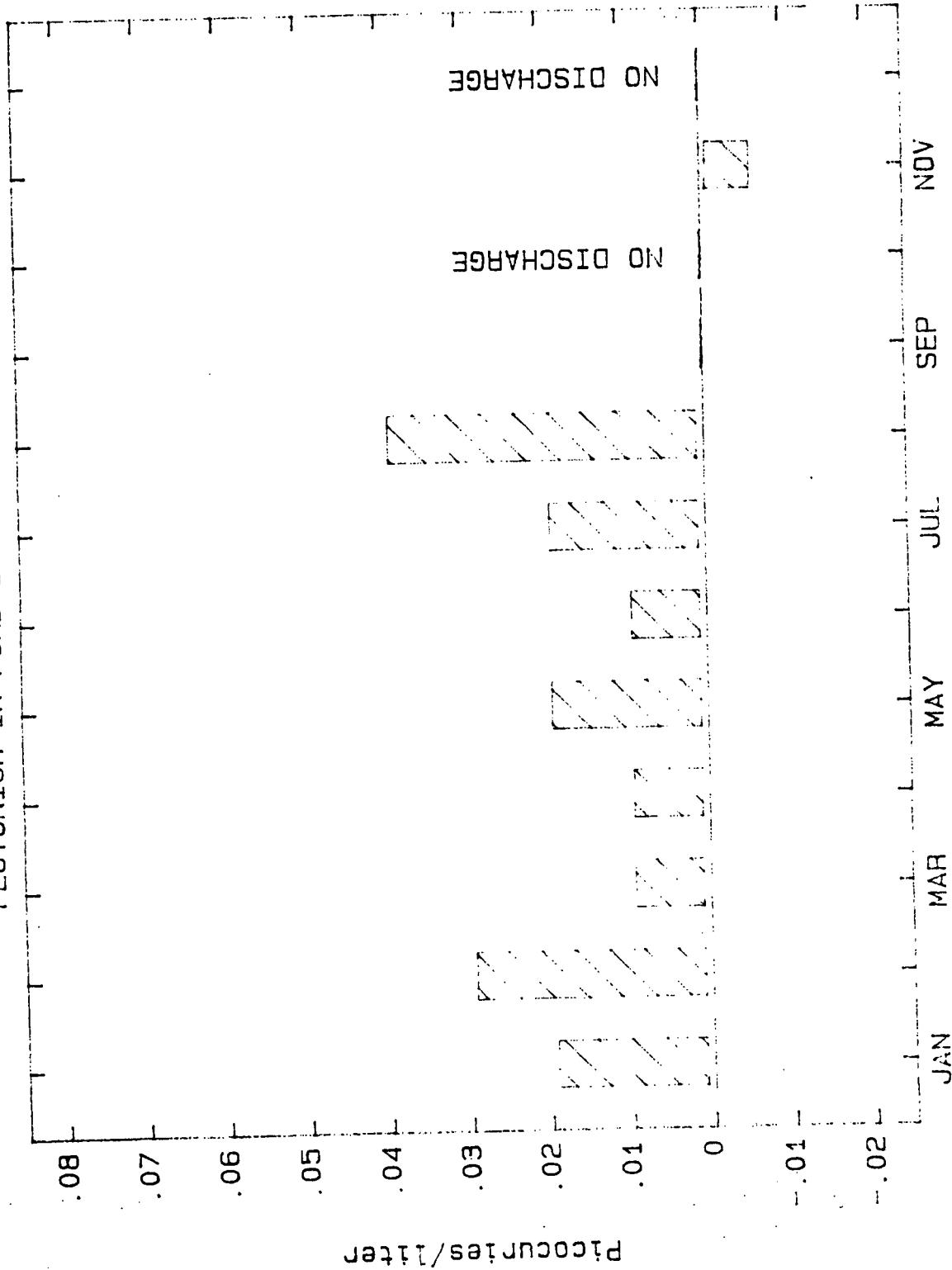
06/30

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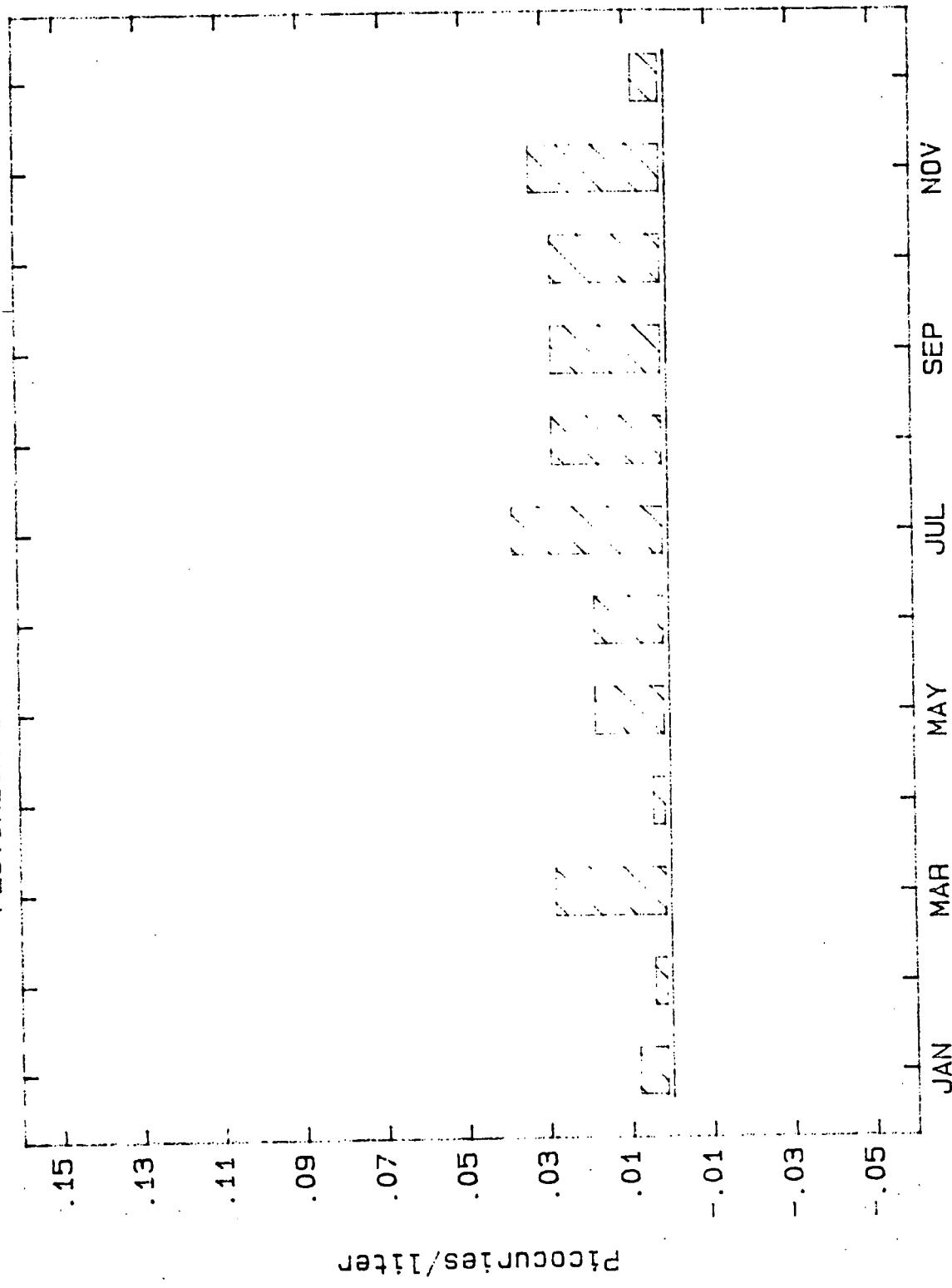
PLUTONIUM IN POND A-4 EFFLUENT WATER



PLUTONIUM IN POND B-5 EFFLUENT WATER

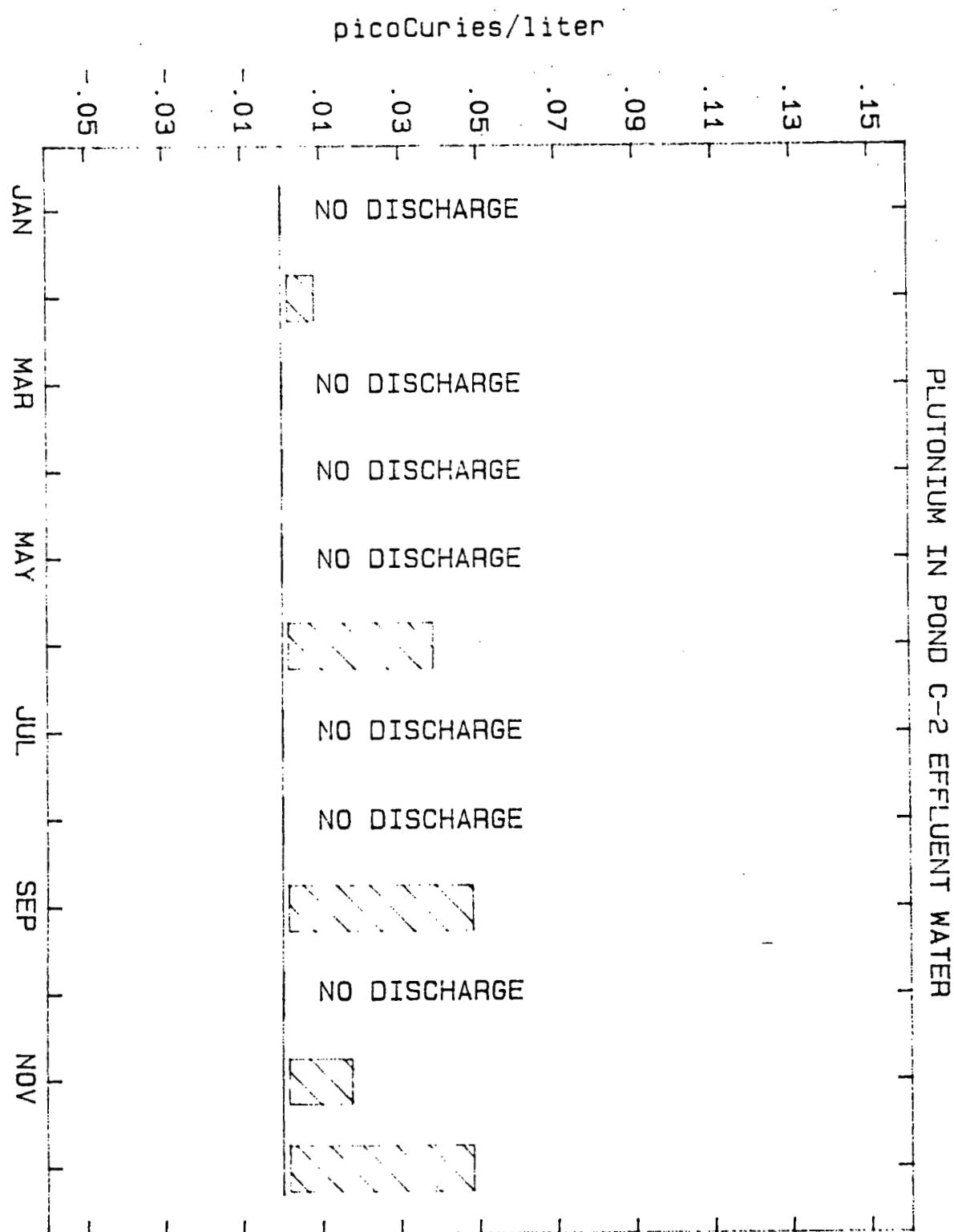


PLUTONIUM IN POND C-1 EFFLUENT WATER

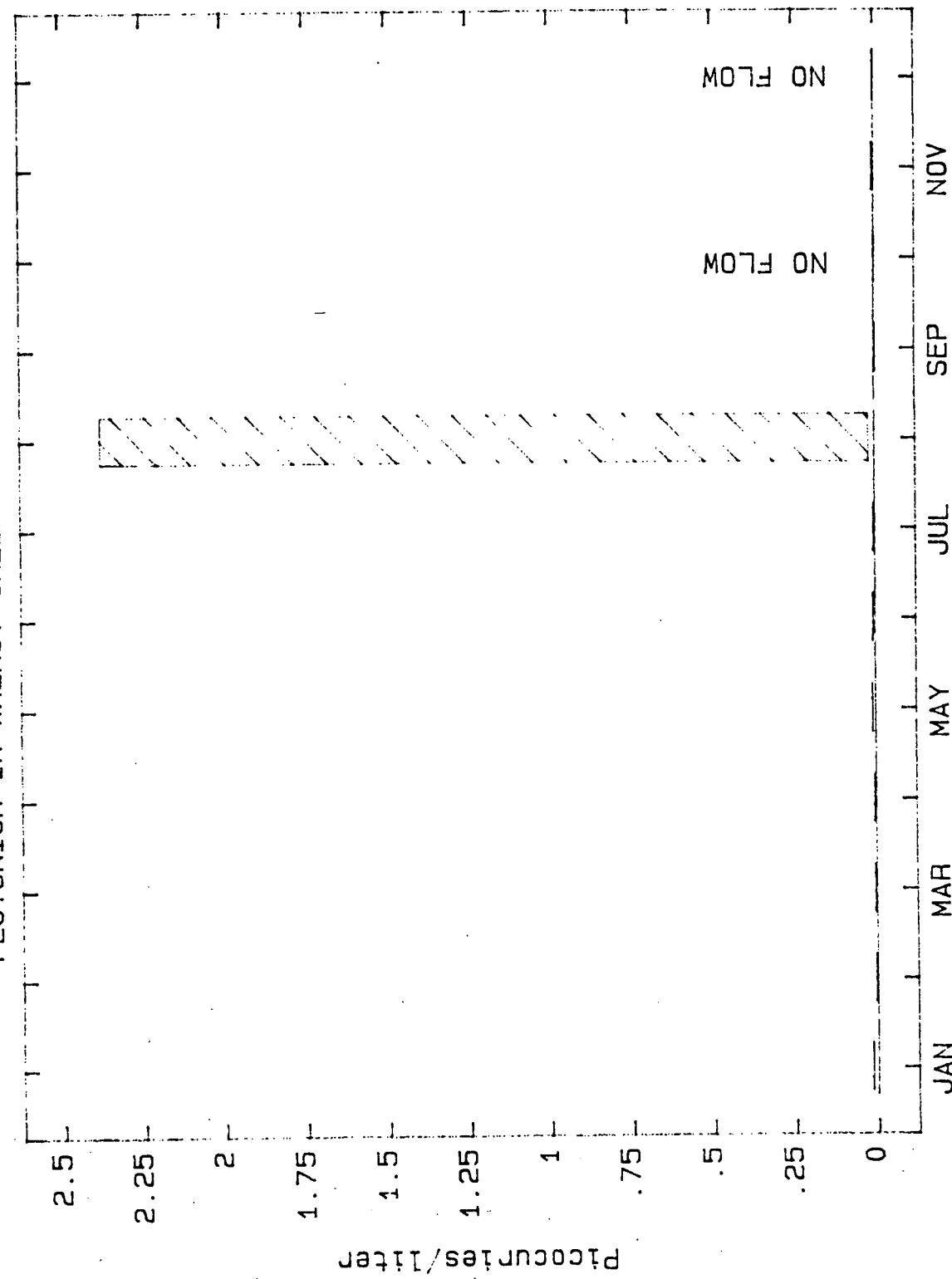


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PLUTONIUM IN WALNUT CREEK AT INDIANA WATER



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Table VIII. Water Sample Results, Radioactive Parameters

Reservoirs (pCi/l)

<u>Location</u>	<u>n</u>	<u>Plutonium</u>	<u>Uranium</u>	<u>Americium</u>
Great Western	1*	-0.002 \pm 0.006	4.9 \pm 0.5	-0.001 \pm 0.005
Standley	1*	0.007 \pm 0.007	2.7 \pm 0.3	-0.002 \pm 0.005

Community Tap Water (pCi/l)

<u>Location</u>	<u>n</u>	<u>Plutonium</u>	<u>Uranium</u>	<u>Americium</u>
Arvada	1	-0.007 \pm 0.020	0.4 \pm 0.1	-0.013 \pm 0.018
Boulder	1*	0.005 \pm 0.007	0.1 \pm 0.1	0.001 \pm 0.005
Broomfield	1*	0.004 \pm 0.007	1.4 \pm 0.2	0.011 \pm 0.022
Denver	1	0.013 \pm 0.021	1.0 \pm 0.2	0.011 \pm 0.021
Golden	1	0.001 \pm 0.021	1.5 \pm 0.2	0.023 \pm 0.042
Lafayette	1	0.011 \pm 0.021	0.2 \pm 0.1	0.001 \pm 0.022
Louisville	1	-0.007 \pm 0.020	0.1 \pm 0.1	-0.004 \pm 0.019
Thornton	1	-0.013 \pm 0.019	4.6 \pm 0.6	0.001 \pm 0.020
Westminster	1*	0.004 \pm 0.007	0.8 \pm 0.2	0.011 \pm 0.022

* Plutonium, uranium and americium analyses were performed on one sample composited from four weekly grab samples. All other analyses were performed on quarterly grab samples.

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Table IX. Water Sample Results, Radioactive Parameters

Tritium (pCi/l)

<u>Location</u>	<u>n</u>	<u>C_{Minimum}</u>	<u>C_{Maximum}</u>	<u>C_{Average}</u>
Pond C-1	3	0 + 400	100 + 400	0 + 400
Pond C-2	1	-400 + 400	-400 + 400	-400 + 400
Arvada	1	900 + 500	900 + 500	900 + 500
Boulder	3	-200 + 400	-100 + 400	-200 + 400
Broomfield	3	-200 + 400	-100 + 400	100 + 400
Denver	1	700 + 500	700 + 500	700 + 500
Golden	1	0 + 400	0 + 400	0 + 400
Great Western	3	0 + 400	300 + 400	200 + 400
Lafayette	1	600 + 500	600 + 500	600 + 500
Louisville	1	-100 + 400	-100 + 400	-100 + 400
Standley	3	-100 + 400	400 + 400	200 + 400
Thornton	1	600 + 500	600 + 500	600 + 500
Westminster	3	-100 + 400	100 + 400	0 + 400

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Table X. Water Sample Results, Nonradioactive Parameters

Nitrate (as N) at Great Western Reservoir

<u>Sample Date</u>	<u>Nitrate (as N) (mg/l)</u>
12/03/87	<0.02
12/10/87	<0.02
12/17/87	0.06

Nitrate (as N) at Standley Lake

<u>Sample Date</u>	<u>Nitrate (as N) (mg/l)</u>
12/03/87	<0.02
12/10/87	<0.02
12/17/87	<0.02

NOTE: For some nonradioactive parameters, the concentrations that are measured at or below the minimum detectable concentration (MDC) are assigned to MDC. The less than symbol (<) indicates MDC values and calculated values that include one or more MDC's.

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Table XI. NPDES Permit Water Sample Results

Discharge 001 (Pond B-3)
No Discharge

<u>Parameter</u>		<u>30-Day Average</u>	<u>Limits</u>	<u>Daily Maximum</u>	<u>Limits</u>
		<u>30-Day* Average</u>	<u>Daily Maximum</u>	<u>Daily Maximum</u>	<u>Daily Maximum</u>
Biochem. Oxygen Demand, 5 Day	mg/l	10		25	
Total Suspended Solids	mg/l	30		NA	
Nitrates as N	mg/l	10		NA	
Total Chromium	mg/l	0.05		0.1	
Total Phosphorus	mg/l	8		NA	
Oil and Grease, Visual		NA		NA	
Total Residual Chlorine	mg/l	NA		0.5	
Fecal Coliforms	#/100 ml	200		NA	
Limits					
pH	S.U.	<u>Minimum</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Maximum</u>
		6.0		9.0	

Discharge 002 (Pond A-3)
No Discharge

<u>Parameters</u>		<u>30-Day Average</u>	<u>Limits</u>	<u>Daily Maximum</u>	<u>Limits</u>
		<u>30-Day Average</u>	<u>Daily Maximum</u>	<u>Daily Maximum</u>	<u>Daily Maximum</u>
Nitrates as N	mg/l	10		20	
Limits					
pH	S.U.	<u>Minimum</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Maximum</u>
		6.0		9.0	

Discharge 003 (RO Pilot Plant)

No Discharge		<u>Limits</u>	<u>Limits</u>
		<u>Minimum</u>	<u>Minimum</u>
pH	S.U.	6.0	9.0

* This limitation applies when a minimum of 3 consecutive samples are taken during separate weeks.

Tables XI. NPDES Permit Water Sample Results (Continued)

Discharge 004 (RO Plant)

<u>No Discharge</u>	<u>Limits</u>		<u>Limits</u>	
	<u>30-Day Average</u>	<u>30-Day* Average</u>	<u>Daily Maximum</u>	<u>Daily Maximum</u>
Total Suspended Solids	mg/l	15		25
Total Organic Compounds	mg/l	22		30
Total Phosphorus	mg/l	8		12
Nitrates as N	mg/l	10		20
Total Chromium	mg/l	0.05		0.1
Total Residual Chlorine	mg/l	NA		0.5
Fecal Coliform	#/100 ml	7-Day Average 400	30-Day Average 200	30-Day Average 200
pH	S.U.	<u>Minimum</u> 6.0	<u>Minimum</u>	<u>Maximum</u> 9.0

Discharge 005 (Pond A-4)

<u>No Discharge</u>	<u>n</u>	<u>C Minimum</u>	<u>C Maximum</u>	<u>C Average</u>
Parameter				
pH	S.U.			
Nitrates as N	mg/l			
Nonvolatile	mg/l			
Suspended Solids				

Discharge 006 (Pond B-5)

<u>No Discharge</u>	<u>n</u>	<u>C Minimum</u>	<u>C Maximum</u>	<u>C Average</u>
Parameter				
pH	S.U.			
Nitrates as N	mg/l			
Nonvolatile	mg/l			
Suspended Solids				

Discharge 007 (Pond C-2)

<u>Parameter</u>	<u>n</u>	<u>C Minimum</u>	<u>C Maximum</u>	<u>C Average</u>
pH	S.U.	3	7.0	7.0
Nitrates as N	mg/l	3	1.09	1.29
Nonvolatile	mg/l	3	1.0	7.0
Suspended solids				3.0

Table XII. Water Sample Results, Nonradioactive Parameters

Walnut Creek at Indiana Street
No Flow

<u>Parameter</u>	<u>n</u>	<u>C_{Minimum}</u>	<u>C_{Maximum}</u>	<u>C_{Average}</u>
pH	S.U.			
Nitrates as N	mg/l			
Total Volume (gallons)	= 0			

Table XII.
 Daily Flow Data Recorded at the
 Walnut Creek at Indiana Gauging Station,
 Ponds A-4 and B-5,
 December, 1987 through January 4, 1988

<u>Date</u>	<u>Walnut Creek at Indiana (gallons)</u>	<u>Pond A-4 gallons</u>	<u>Pond B-5 gallons</u>
12/01/87	-	-	-
12/02/87	-	-	-
12/03/87	-	-	-
12/04/87	-	-	-
12/07/87	-	-	-
12/08/87	-	-	-
12/09/87	-	-	-
12/10/87	-	-	-
12/11/87	-	-	-
12/14/87	-	-	-
12/15/87	-	-	-
12/16/87	-	-	-
12/17/87	-	-	-
12/18/87	-	-	-
12/21/87	-	-	-
12/22/87	-	-	-
12/23/87	-	-	-
12/24/87	-	-	-
01/04/88	-	-	-
Total Volume	-	-	-

Table XIII.
 Daily Flow Data Recorded at
 Ponds C-1 and C-2 during
 December, 1987 through January 4, 1988
 (Woman Creek)

<u>Date</u>	<u>Pond C-1 Gallons</u>	<u>Pond C-2 Gallons</u>
12/01/87	676,000	
12/02/87	742,000	
12/03/87	646,000	
12/04/87	282,000	
12/07/87	2,542,000	
12/08/87	636,000	
12/09/87	748,000	
12/10/87	640,000	
12/11/87	686,000	
12/14/87	2,144,000	
12/15/87	628,000	
12/16/87	698,000	
12/17/87	687,000	
12/18/87	754,000	
12/21/87	2,080,000	
12/22/87	628,000	2,591,600
12/23/87	688,000	2,696,000
12/24/87	702,000	
01/04/88	7,644,000	
Total Volume	21,708,000	5,287,600